



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/722,498

11/28/2000

Huaiyu Zeng

105492

5573

7590

06/23/2004

S.H. Dworetsky  
AT&T Corp.  
P.O. Box 4110  
Middletown, NJ 07748

EXAMINER

KIM, KEVIN

ART UNIT

PAPER NUMBER

2634

5

DATE MAILED: 06/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/722,498

Applicant(s)

ZENG ET AL.

Examiner

Kevin Y Kim

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 November 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of Ariyavisitakul (IEEE).

Consider claims 1, 9, 11 and 19. The present application describes a prior art by referring to Figs. 1-3, designated as "an exemplary communication system" as opposed to Figs. 3-7, described as "according to the present invention." See "Brief Description of The Drawings" section. The descriptions of Figs. 1-3 are given at pages 3-5 although they appear in "Detailed Description" section of the specification. According to the descriptions, one of conventional receivers has a number of antennas, each of which estimates a received signal, i.e., "characterizing a set of two or more communication channels." An equalizer is used to mitigate inter-symbol interference. Furthermore, either forward time delays or reverse time delay are determined for respective communication channels or antennas. Though not described explicitly, the determination of delays are based on the communication channels themselves and "a common composite matrix" such as the result of an equalizer in order to more accurately extract the transmitted information. Page 4, lines 6-12. The distinction between this conventional receiver and the present invention is that "conventional receivers that use timing recovery do not optimize for errors by taking into account both the forward-time and time-reverse modes," page 3, lines 4-5 while the claimed invention performs both forward time delay determination and reverse time delay determination and selecting one of the forward and reverse time delays.

Referring to Fig. 6, Ariyavisitakul teaches a time-reversal operation in a receiver as well as a forward time operation that provides an optimum timing corresponding to the minimum residual MSE and selecting one of the modes in choosing an optimum timing in order to allow the equalizer to maximize its compensation capability. Pages 594-595. The joint estimator reads on "a forward-time device," "a time-reverse device" and "a selector" of claim 11, as it performs the function of the claimed devices as explained above.

Art Unit: 2634

Thus, it would have been obvious to one skilled in the art to perform both forward-time delay value determination and a time-reverse delay value determination that will result in optimum timing and selecting a better one, in the convention receiver described above, for the purpose of maximize its compensation capability of the equalizer, as taught by Ariyavisitakul.

Regarding claims 2,3,12,13, minimum mean square error (MMSE) is a well known equalizer technique. See application page 2, lines 24-27.

Regarding claims 4 and 14, Ariyavisitakul teaches selecting the operation mode which gives the smaller minimum residual MSE. Page 595, right column.

Regarding claims 5 and 15, once either forward or reverse mode is selected, "a number of symbols" would be estimated based on the selected delay.

Regarding claims 6,7,8,16,17,18, DFE, MMSE-DFE and ADDFSE are well known equalizer techniques. See application page 2, lines 24-27.

Regarding claims 10 and 20, the received signal would be would be delayed in accordance with the selected delay once the delays are determined.

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Stroll et al (US 6,560,299), Friedman (US 6,452,989) and Schilling (US 6,256,340) teaches adjusting delays in a diversity receiver.


Art Unit: 2634

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Y Kim whose telephone number is 703-305-4082. The examiner can normally be reached on 8AM --5PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

kvk



STEPHEN CHIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600